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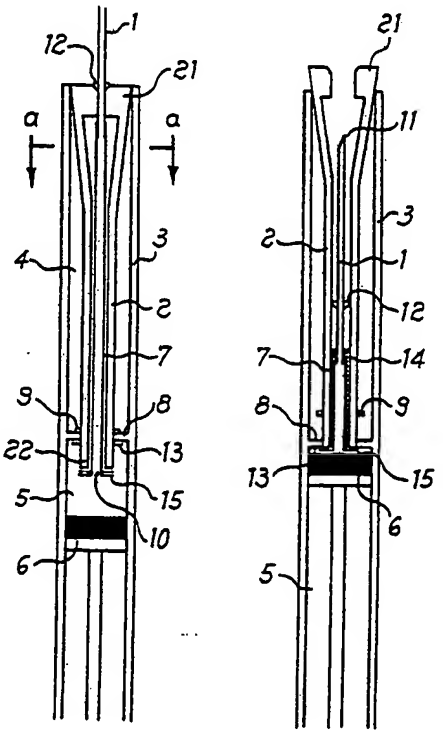
(54) Title: SYRINGE FOR MEDICAL USE WITH NON-REUSABLE AUTOMATICALLY DISAPPEARING NEEDLE

(57) Abstract

Syringe with automatic retraction of the needle (1) by means of an elastic system (7) following the end-of-travel pushing exerted by the piston (7) on the cylindrical base (22) of the "flower" (2), that in opening releases the needle (1), which falls into the front chamber (4), leaving no possibility of being re-utilized.



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"SYRINGE FOR MEDICAL USE WITH NON-REUSABLE AUTOMATICALLY DISAPPEARING NEEDLE"

DESCRIPTION

The object of this invention is a syringe for intravenous use and the like, with an automatically disappearing needle, suitable to eliminate any risk of injury after the use and non-reusable.

As known, the disposable syringes that are on sale are normally equipped, depending on the model, with a needle either fixed or mobile, and with a protecting cap which is taken off just before the utilization.

The cap which has a basically cylindrical or slightly conical shape, with a mouth on the larger side, has to be re-placed on the needle after the injection, not to leave the latter unoovered, avoiding in this way accidental injuries.

As the mouth of the needle's protection cap is rather small, there exists the risk of its not being centered when the needle is re-inserted in the cap. In order to eliminate or at least to reduce the injury risk during the covering of the needle, it has been already proposed to provide a needle protecting cap, which can be shifted from a rest position, in which said cap covers it totally, to a utilization position, in which said cap wraps around a cylindrical projection of the needle, uncovering it. Having made

the injection, the cap can be caused to slide again on the needle, by deliberate act of the user.

The non-execution of this act involves naturally the chance of re-using the syringe and the risk of leaving around in the environment syringes having a mounted needle, which already happens with those which are on sale.

The aim of this invention is to eliminate the above mentioned inconveniences and to revolutionize the solutions proposed, making the syringe no longer utilizable and providing a protection system against accidental injuries which is simple, economical and safe.

This aim is obtained, according to this invention, through the characteristics listed in the characterizing part of the enclosed claims 1 and 2.

The advantageous characteristics of the invention shall appear clearer from the following detailed description, referred to some embodiments that are to be construed as mere, non limitative examples, illustrated in the enclosed drawings, wherein:

Fig 1 is a side view of two syringes according to this invention, the first of which shows the exposed needle and the second one the retracted needle. Such retraction is due to the pushing of the piston on the cylinder projecting in the rear chamber of the syringe;

Fig 2 and 3 are an enlargement of Fig 1, showing the de-

tails more clearly;

Fig 4 is a median section along the a-a line of Fig 2;

Fig. 5 and 6 are side views of "flower" 2, in closed and open position respectively;

Fig. 6 and 9 are side views of "flower" 2, in closed an open position respectively, said flower being housed in the section of the front chamber 4 of the syringe;

Fig. 7 and 10 are median sections of Fig. 6 and 9;

Fig. 11 is an exploded view of needle 1;

Fig. 12 is an exploded view of needle 1 assembled to the elastic tube 7 in extended position;

Fig. 13 is a view of the needle of Fig. 12 with the elastic tube 7 in retracted position;

Fig. 14 and 15 are side views of a variant of the needle retraction system, with the first view showing the needle exposed and the second view with the needle retracted.

With reference to such drawings, the reference numerals 1, 2 and 4 indicate respectively the needle, the "flower" and the front chamber of the syringe according to this invention.

The needle 1 is a standard syringe needle, comprising a tip 11 and a ring nut 12 at 2/3 from the tip, said ring nut being suitable to prevent the mounted needle from re-entering, and a base 14 to which an elastic means 7 engages that, once the needle is released, brings it into "flower"

2.

The "flower" 2 has a basically truncated-conic-cylindrical shape, constituted by three "petals" 21 which form from a tubular base 24 in which a cylindrical recess is provided, suitable to cause the needle to slide and to house it.

The "flower" 2 is made of an elastic material, which in a rest position permits to the three "petals" 31 to remain divaricated, while they unite once housed in the front chamber 4, leaving a central hole occupied by the needle.

Near base 22 of "flower" 2, two projections are provided, constituting a shoulder suitable to prevent "flower" 2 from falling into the rear chamber 5 of the syringe.

The base 15 of the elastic tube 7 hooks up on base 22, while the opposite end of said base 15 slips in bottom 14 of needle 1.

The elastic means 7 is constituted by a small rubber tube performing two functions: a function of communication between chamber 5 and needle 1 and a return function for needle 1 within the cylindric recess of "flower" 2.

Said elastic means 7 is in extended stage when needle 1 is mounted, while it is in relaxation stage after the release and return of needle 1 into the cylindrical recess of "flower" 2. The base 15 of the elastic tube 7 has a groove 16 in the part looking towards chamber 5, said groove being suitable to facilitate the flowing of the fluid contained

in the syringe.

The syringe according to this invention is different from a standard syringe in that it has at one end a receiving chamber 4 of needle 1, which chamber also holds back the above described structures and is separated from chamber 5 by a small diaphragm 8, which permits to keep "flower" 2 axial and to cause its forwards sliding following the push by piston 6.

In sucking up during the utilization, piston 6 is free to move along its longitudinal axis within chamber 5 of the syringe, while in the end-of-travel injection stage it meets base 15 of the elastic means 7, causing the forwards shifting of "flower" 2, the coming out of "petals" 21 of the front chamber 4 and the ensuing opening, release and return of the needle into the cylindrical recess of "flower" 2.

A rubber ring 13, which ensures the tightness between chamber 5 and chamber 4 and is in touch with diaphragm 8, is provided round base 22 of "flower" 2.

There is now described the embodiment variant of the elastic means 7, which utilizes a small rubber spring, coaxial with needle 1.

To be compressed, said spring lies at one end on a protruding ring within the cylindrical recess of "flower" 2, in correspondence of point 24 and at the other end on an

annular projection of base 14 of needle 1.

In this case, the release mechanism of needle 1 is the same as that of this invention, while the retraction mechanism with disappearance of needle 1 is caused by the extension of the spring.

Another embodiment of this invention provides for the substitution of the small elastic tube having the double function of connecting the rear chamber 5 with base 14 of needle 1 and to act as an elastic means, with two distinct means, an elastic means and a connecting means, being the first one a thin rubber elastic thread, and the second one a small Teflon elastic tube, or the like.

Still a further embodiment of this invention is represented by the modification of the retraction system of the needle, for which a deliberate action is necessary. Therefore, such modification will be offered those who wish to make the syringe harmless by the retraction of the needle, following the deliberate retraction of the piston.

The release system of the needle is the same as that previously described, while the system of disappearance is obtained through the hooking up of tongue 14' on to the metal or synthetical small wheel 20 provided in a small recess 30 formed at the rubber end of piston 6 upon end of travel of the latter.

CLAIMS

1. A syringe for medical use provided with two chambers (4) (5), separated by a diaphragm (8), containing one a blocking-release means (2) of needle (1) and the other one the fluid and piston (6), such that piston (6) can push base (22) of "flower" (2), causing the opening of "petals" (21), the ensuing release of needle (1), the action of the elastic means (7) and the disappearance of needle (1) within the syringe.

2. A syringe for medical use provided with two chambers (4) (5), separated by a diaphragm (8), such as to contain a blocking-release means (2) of needle (1), constituted by a truncated-conic-cylindrical structure of elastic material, with three "petals" (21) which form from a tubular base (24), where a cylindrical recess is housed suitable to receive the elastic means (7), which permits the retraction of needle (1), and said needle (1).

3. A syringe according to claims 1 and 2, characterized in that two projections (9) are provided near base (22) of "flower" (2), said projections forming a shoulder suitable to prevent "flower" (2) from falling into the rear chamber (5) of the syringe.

4. A syringe according to claim 3, characterized in that the "petals" (21, in correspondence of the central hole, have a rounding off such as to form a truncated-conic

recess intended for receiving ring nut (12) of needle (1).

5. A syringe according to claim 1 to 4, characterized in that the elastic means (17) is a small rubber tube, engaged at one end on base (14) of needle (1), and at the other end on base (22) of "flower" (2), with its base (15) on which a groove (16) is provided, suitable to facilitate the flowing of the fluid contained in the syringe.

6. A syringe according to the preceding claims, characterized in that needle (1) is a standard syringe needle on which a ring nut (12) of a basically truncated-conic-cylindrical shape is provided, and at whose base (14) the elastic small tube (7) engages.

7. A syringe according to claim 6, characterized in that an annular projection is provided on base (14) of needle (1), said projection constituting a shoulder for the steel spring or any similar elastic means.

8. A syringe according to any of the claims 1 to 6, characterized in that said elastic means (7) is constituted by a steel spiral spring, coaxial with needle (1).

9. A syringe according to claims 6 and 7, characterized in that the elastic means (7) is constituted by an elastic thread.

10. A syringe according to claims 8 and 9, characterized in that the connection between base (14) of needle (1) and the rear chamber (5) is obtained by means of a small tube

of Silastic, Teflon or the like.

11. A syringe according to claims 1 to 4, wherein the front chamber (4) is constituted by tang (4') having the same functions.

12. A syringe according to claim 11, characterized in that needle (1) is a standard syringe needle on which at about 2/3 from the tip a ring nut (12) having a truncated-conic-cylindrical shape is provided, and on whose base two or three opposing tongues (30) are formed.

13. A syringe according to claims 11 and 12, characterized in that a small recess is provided within the rubber end of piston (6), in which recess there is a small metal or synthetical net (20), suitable for holding in tongues (30).

14. A syringe acoording to claims 11 to 13, characterized in that a rubber washer (13), suitable to ensure tightness, is provided on the passage point between tang (4') and the rear chamber (5).

Fig.1

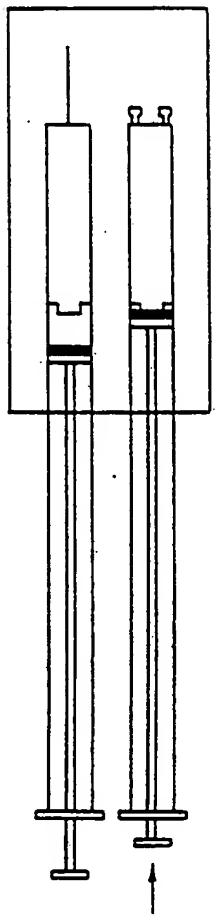


Fig.2

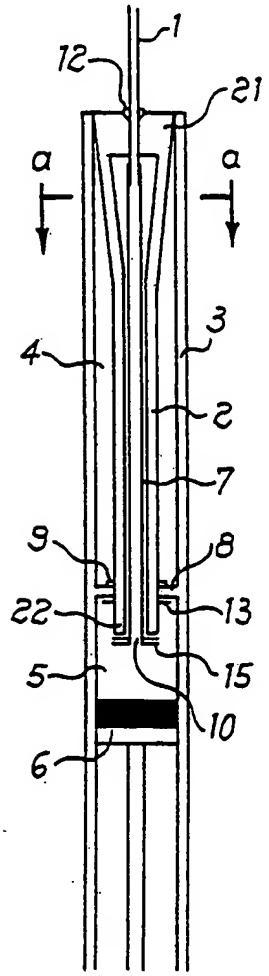
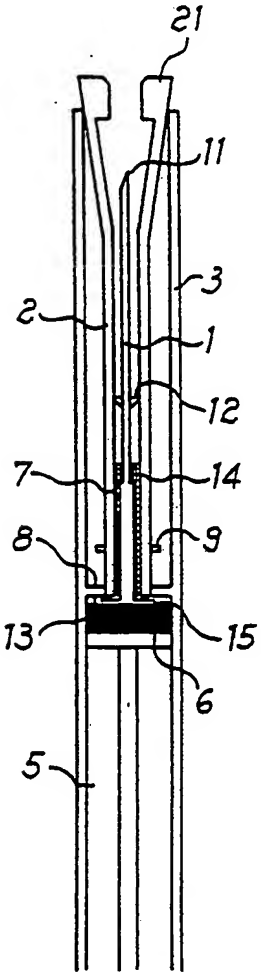


Fig.3



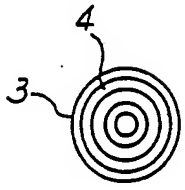


Fig.4

sez. a-a

Fig.5

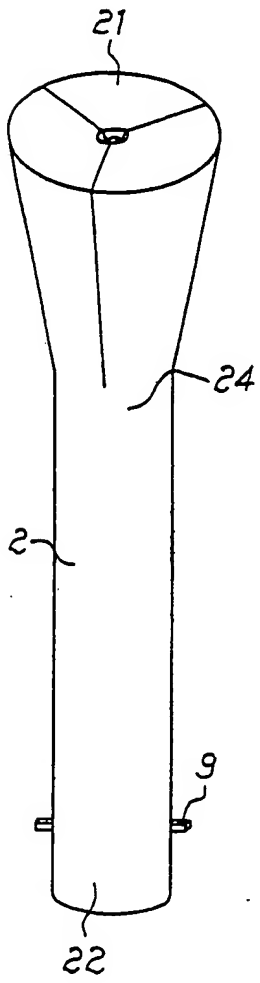


Fig.6

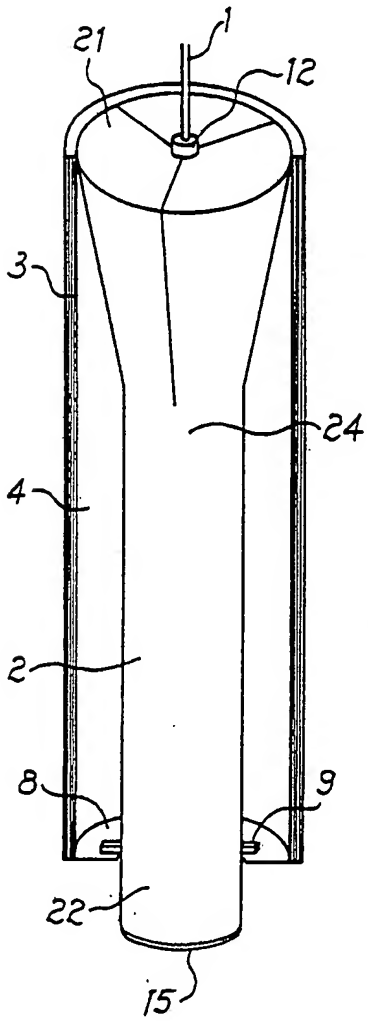


Fig.7

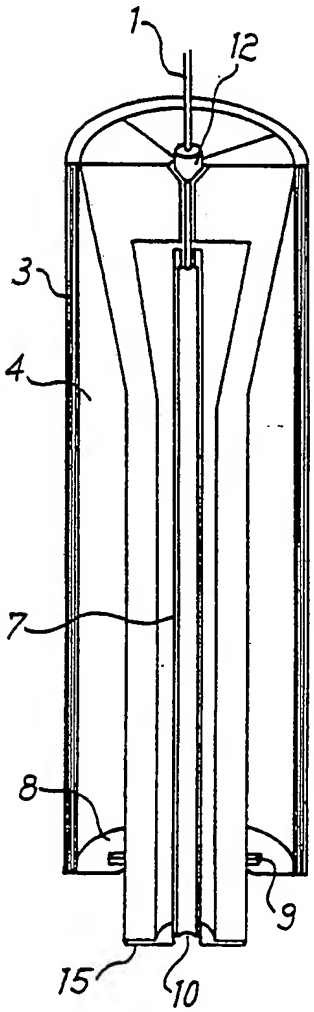


Fig.8

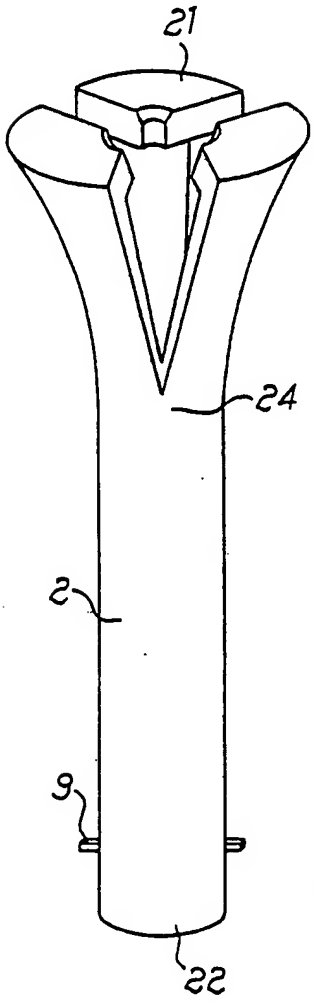


Fig.9

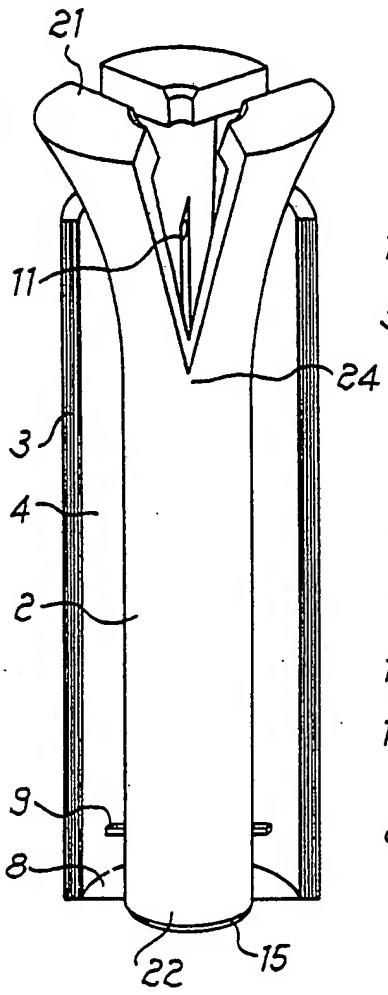


Fig.10

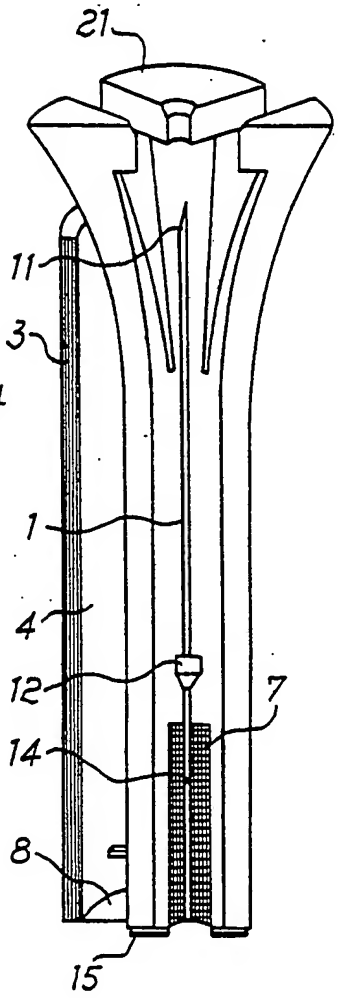


Fig.11

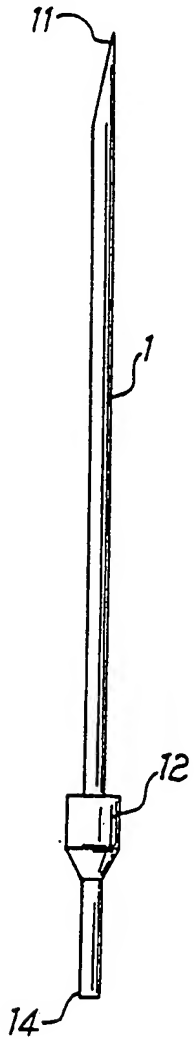


Fig.12

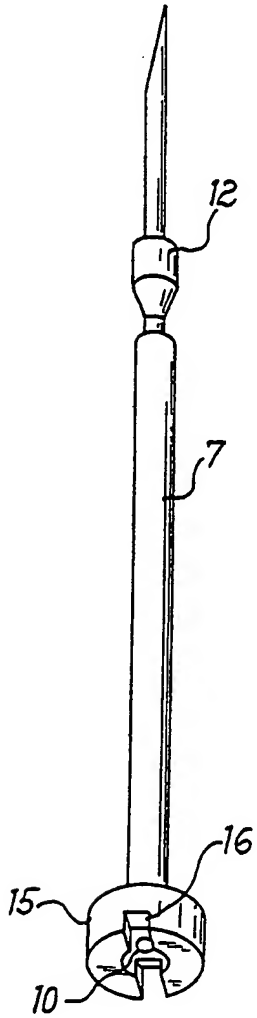


Fig.13

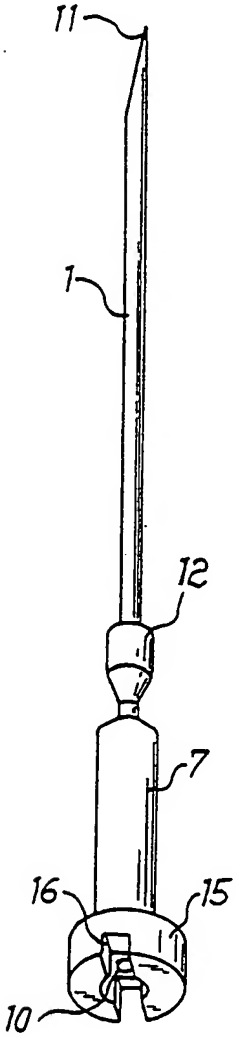


Fig.14

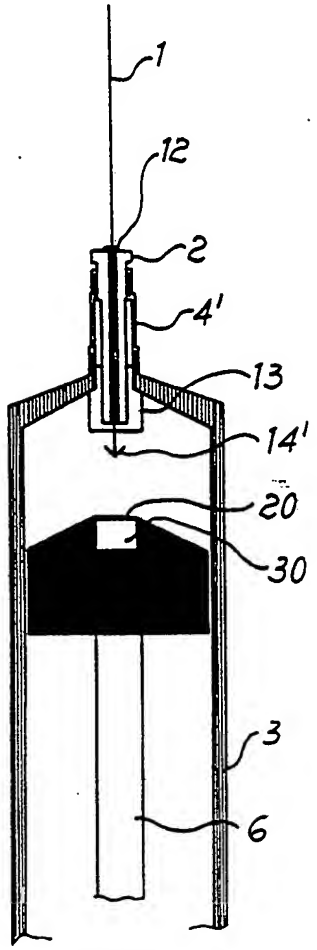
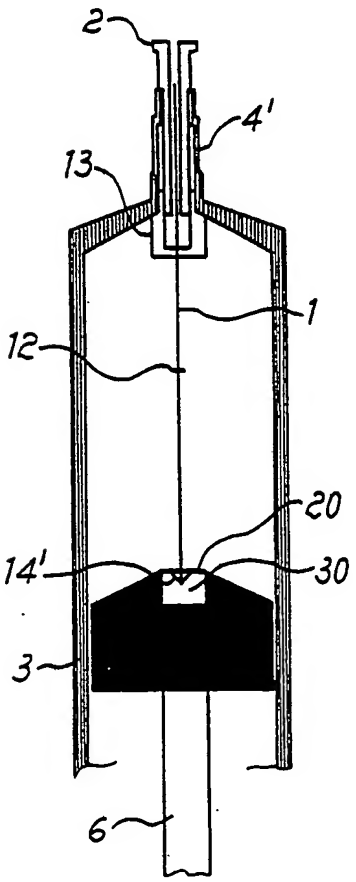


Fig.15



INTERNATIONAL SEARCH REPORT

PCT/EP 93/00691

International Application No

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 A61M5/32; A61M5/50

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	A61M

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category[10]	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
X,P	EP,A,0 515 766 (CASELLI) 2 December 1992 see column 4, line 31 - line 36 see column 6, line 5 - line 18; figures 3,7	1,2
A,P	---	3,7,8,11
X	US,A,5 092 853 (COUVERTIER, II) 3 March 1992 see column 5, line 19 - line 31; figure 1	1,2
A	---	5
A	WO,A,8 900 435 (GAARDE) 26 January 1989 see page 4, line 31 - line 32 see page 5, line 10 - line 17; figures 1,2	1,6-8

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
29 JUNE 1993	13.07.93
International Searching Authority	**Signature of Authorized Officer**
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III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

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A	US,A,4 995 870 (BASKAS) 26 February 1991 see column 2, line 35 - line 38 see column 2, line 54; figures 3,5	6,12
A	WO,A,9 110 462 (DAVIES) 25 July 1991 see page 4, line 15 - line 18 see page 6, line 15 - line 18; figures 1,3	7,13,14

ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. EP 9300691
SA 72327

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